Stoller
Grand Junction Office established 1959

299-E13-58 (A5873)
Log Data Report

Borehole Information:

Borehole: 299-E13-58 (A5873)			**Site:** 216-B-31 Trench		
Coordinates (WA State Plane)		**GWL (ft)[1]:** Not deep enough		**GWL Date:** 6/11/03	
North	**East**	**Drill Date**	**TOC[2] Elevation**	**Total Depth (ft)**	**Type**
134,372.38 m	573,087.68 m	Sept. 1982	227.402 m	50	Cable Tool

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded steel	1.9	8 5/8	8	5/16	+1.9	50
The logging engineer measured the casing stick up using a steel tape. A caliper was used to determine the outside casing diameter. The caliper and inside casing diameter were measured using a steel tape. Measurements were rounded to the nearest 1/16 in. Casing thickness was calculated.						

Borehole Notes:

Borehole coordinates, elevation, and well construction information are from measurements by Stoller field personnel, HWIS[3], and Chamness and Merz (1993). Zero reference is the top of the 8-in. casing. A 2-ft x 8-in.-thick round grout seal surrounds the casing on the ground surface.

Logging Equipment Information:

Logging System:	Gamma 2E		**Type:** SGLS (70%)
Calibration Date:	3/2003	**Calibration Reference:**	GJO-2003-430-TAC
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2/Repeat	3	4	
Date	6/12/03	6/12/03			
Logging Engineer	Spatz	Spatz			
Start Depth (ft)	50.0	14.0			
Finish Depth (ft)	3.0	9.0			
Count Time (sec)	100	100			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	1.0	1.0			
ft/min	N/A[4]	N/A			
Pre-Verification	BE038CAB	BE038CAB			
Start File	BE039000	BE039048			
Finish File	BE039047	BE039053			

Log Run	1	2/Repeat	3	4	
Post-Verification	BE039CAA	BE039CAA			
Depth Return Error (in.)	0	0			
Comments	No fine-gain adjustment.	Repeat section.			

Logging Operation Notes:

Zero reference was top of the 8-in. casing. Logging was performed with a centralizer installed on the sonde. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT (^{40}K, ^{238}U, and ^{232}Th) verifier with serial number 082. During SGLS logging, fine-gain adjustments were not needed.

Analysis Notes:

Analyst:	Sobczyk	Date:	06/30/03	Reference:	GJO-HGLP 1.6.3, Rev. 0

SGLS pre-run and post-run verification spectra were collected at the beginning and end of each day. All of the verification spectra were within the control limits. The peak counts per second (cps) at the 609-keV, 1461-keV, and 2615-keV photopeaks on the post-run verification spectra as compared to the pre-run verification spectra for each day were between 3 percent lower and 2 percent higher at the end of the day.

Log spectra for the SGLS were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. The pre-run verification spectrum was used to determine the energy and resolution calibration for processing the SGLS data using APTEC SUPERVISOR. Concentrations were calculated in EXCEL (source file: G2EMar03.xls), using parameters determined from analysis of recent calibration data. Zero reference was the top of the 8-in. casing. Based on Chamness and Merz (1993), the casing configuration was assumed to be one string of 8-in. casing to the maximum depth of the logging (50 ft). The casing correction factor was calculated assuming a casing thickness of 5/16 in. This casing thickness was measured in the field by the logging engineer. Water and dead time corrections were not needed or applied to the data.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K, ^{238}U, and ^{232}Th), and man-made radionuclides. Plots of the repeat logs versus the original logs are included. In addition, a comparison log plot of man-made radionuclides is provided to compare the data collected in 1999 by Waste Management Federal Services NW's Radionuclide Logging System (RLS) with SGLS data. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation. The ^{214}Bi peak at 1764 keV was used to determine the naturally occurring ^{238}U concentrations on the combination plot rather than the ^{214}Bi peak at 609 keV because it exhibited slightly higher net counts per second.

Results and Interpretations:

^{137}Cs and ^{60}Co were the man-made radionuclides detected in this borehole. ^{137}Cs was detected in the intervals from near the ground surface (5 ft) to 13 ft and between 40 and 50 ft. The range of concentrations was from the MDL (0.2 pCi/g) to 2.7 pCi/g, which was measured at 6 ft. ^{60}Co was detected in the interval from 38 ft to 47 ft at concentrations near the MDL (0.1 pCi/g).

A recognizable change in the KUT logs occurred in this borehole. An increase of 5 pCi/g in apparent ^{40}K concentrations occurs at 25 ft, which indicates a transition to finer grained sediments.

The plots of the repeat logs demonstrate reasonable repeatability of the SGLS data for the man-made radionuclides (662 keV) and natural radionuclides (609, 1461, 1764, and 2614 keV). The ^{137}Cs concentration based on 662-keV photopeak did not repeat at 9, 12, and 13 ft.

Comparison log plots of data collected in 1999 by Waste Management Federal Services NW and in 2003 by Stoller are included. The RLS concentration data for ^{137}Cs and ^{60}Co are decayed to the date of the SGLS logging event in June 2003. Comparison of the ^{137}Cs and ^{60}Co concentrations indicates that the RLS and SGLS data appear to agree for these radionuclides. Since 1999, ^{137}Cs and ^{60}Co activities appear to have decreased as predicted by radioactive decay.

References:

Chamness, M.A., and J.K. Merz, 1993. *Hanford Wells*, PNL-8800, Pacific Northwest Laboratory, Richland, Washington.

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[1] GWL – groundwater level
[2] TOC – top of casing
[3] HWIS – Hanford Well Information System
[4] N/A – not applicable

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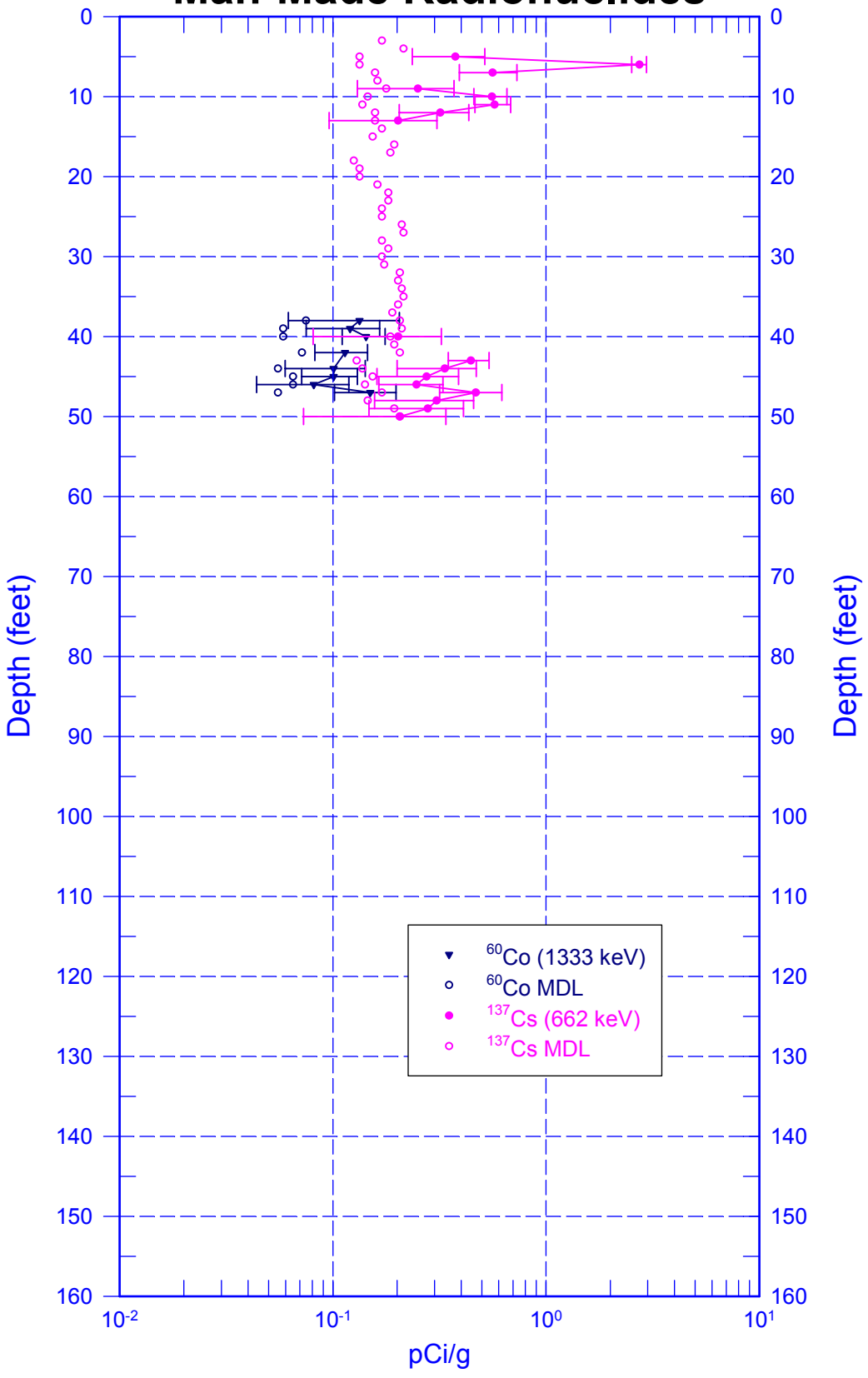
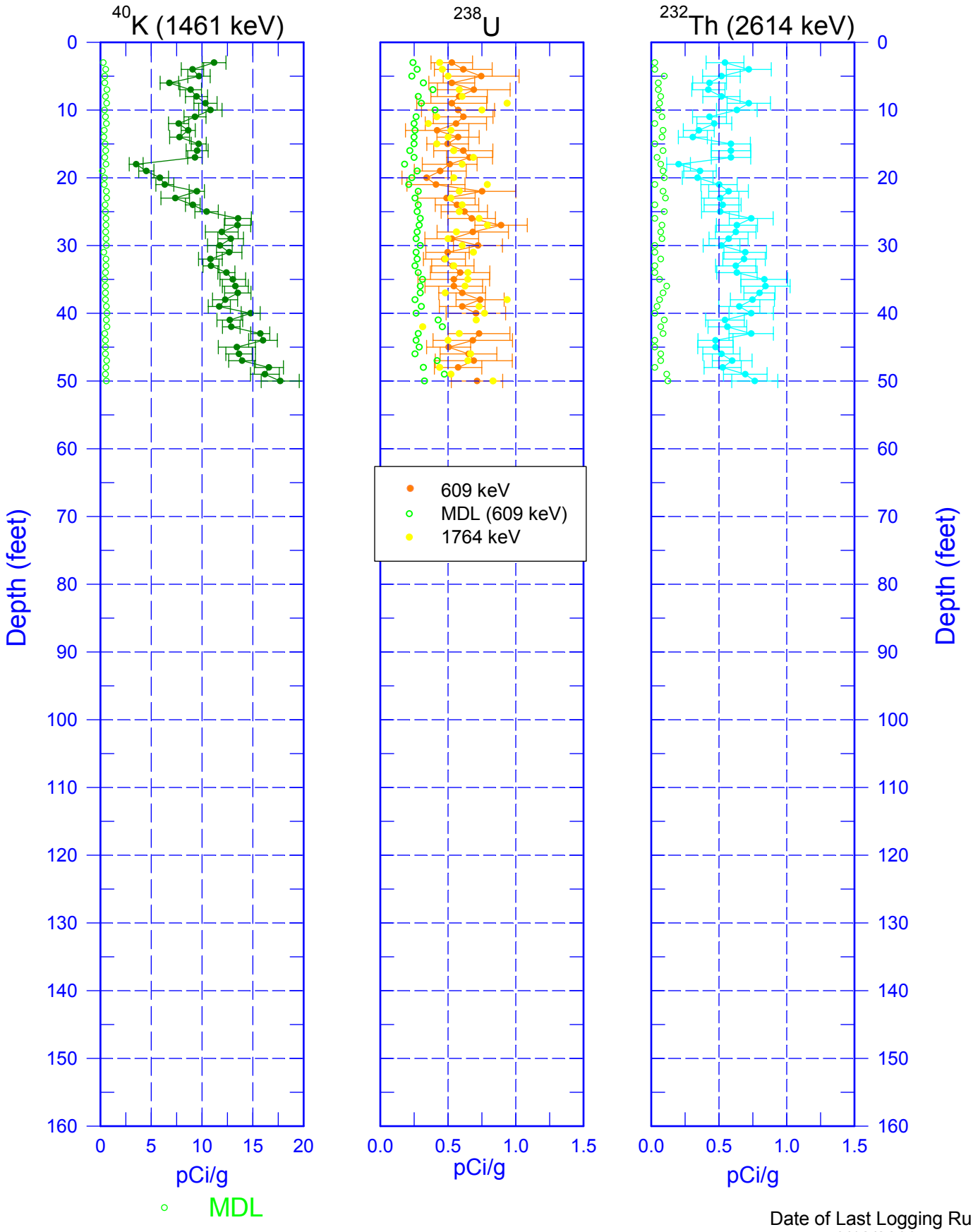
Man-Made Radionuclides



Zero Reference = Top of Casing

Date of Last Logging Run
6/12/2003

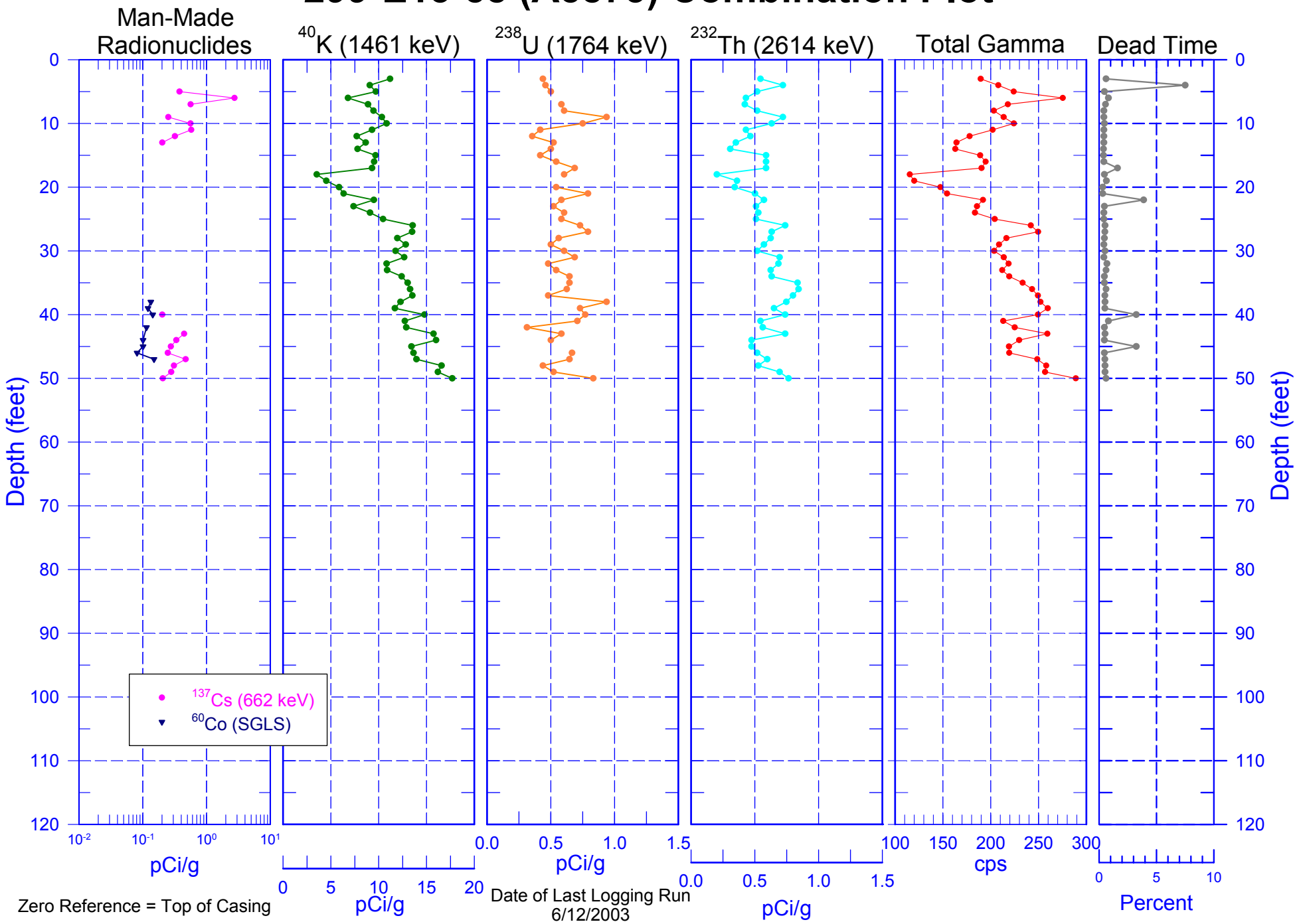
299-E13-58 (A5873)
Natural Gamma Logs



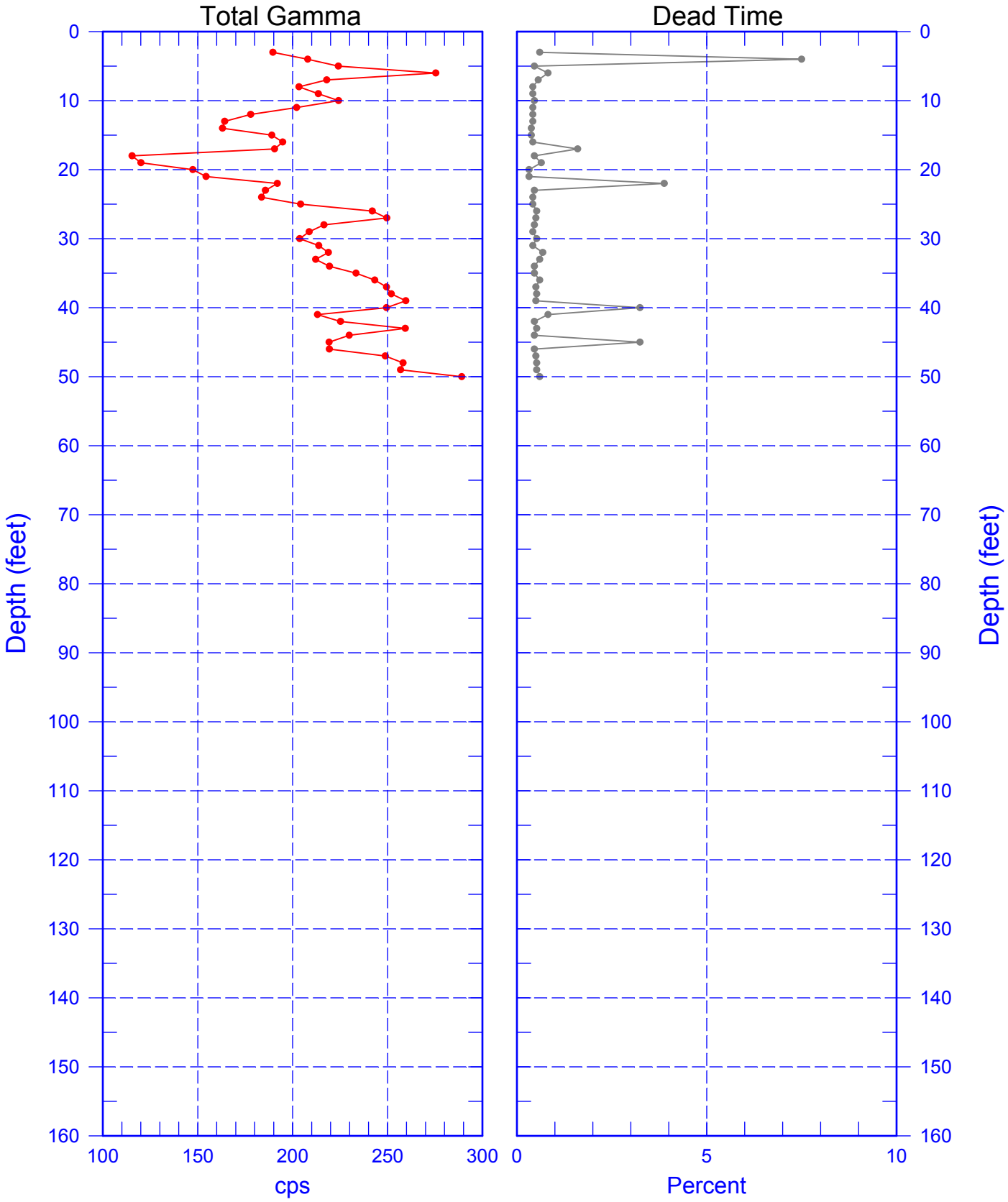
Zero Reference = Top of Casing

Date of Last Logging Run
6/12/2003

299-E13-58 (A5873) Combination Plot



299-E13-58 (A5873)
Total Gamma & Dead Time



Zero Reference = Top of Casing

Date of Last Logging Run
6/12/2003

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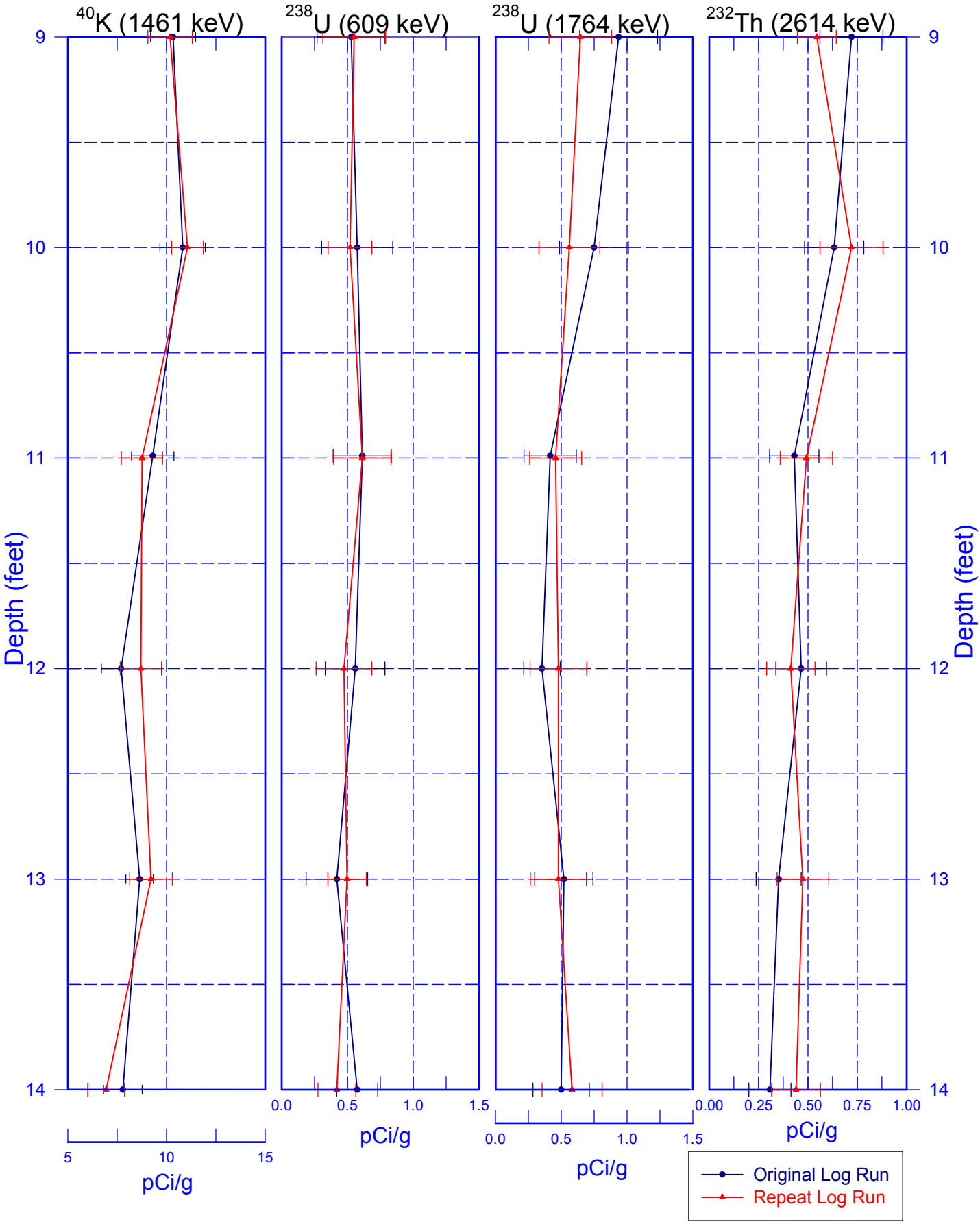
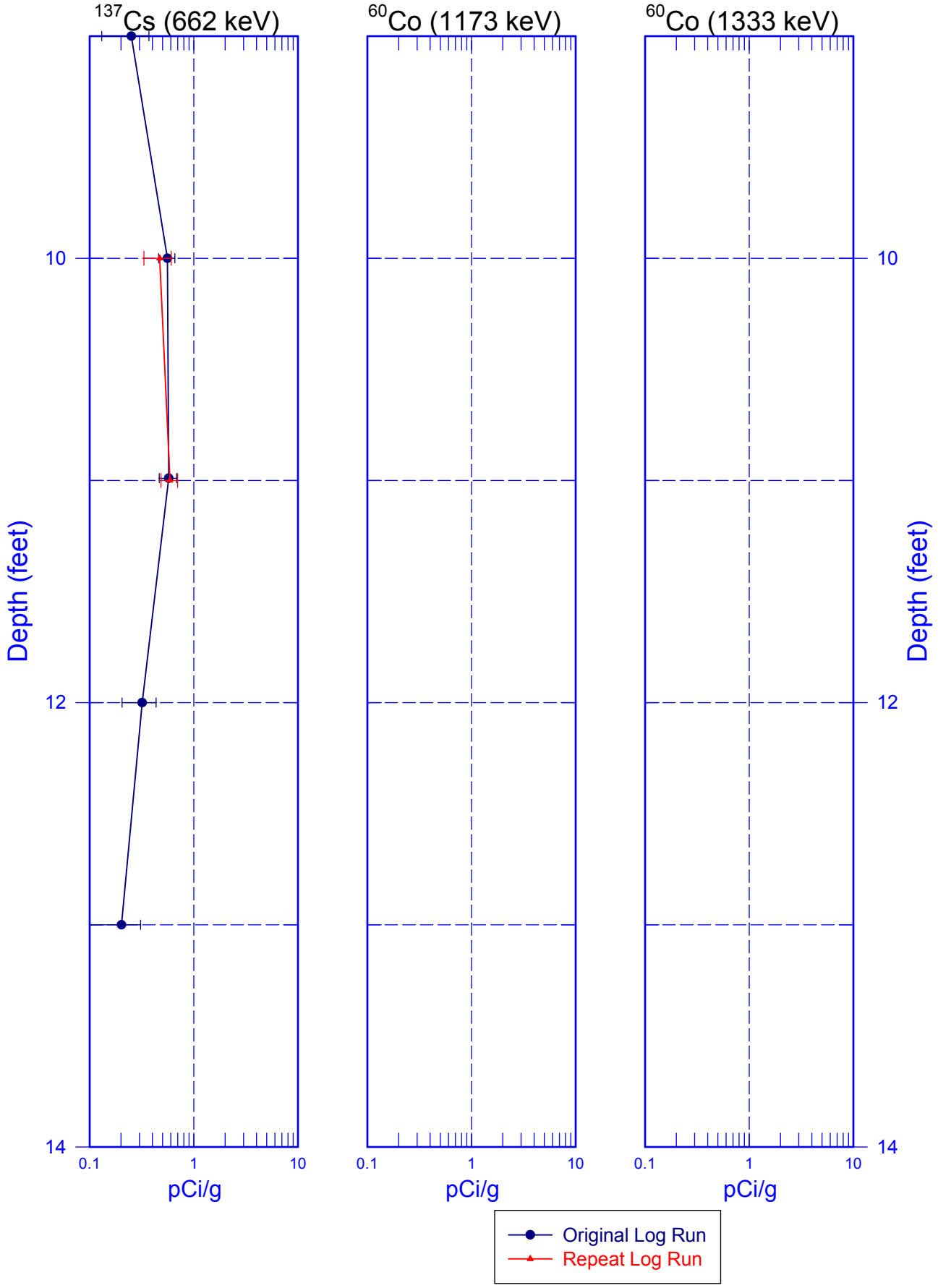
Rerun of Natural Gamma Logs (14.0 to 9.0 ft)



299-E13-58 (A5873)

Rerun of Man-Made Radionuclides (14.0 to 9.0 ft)



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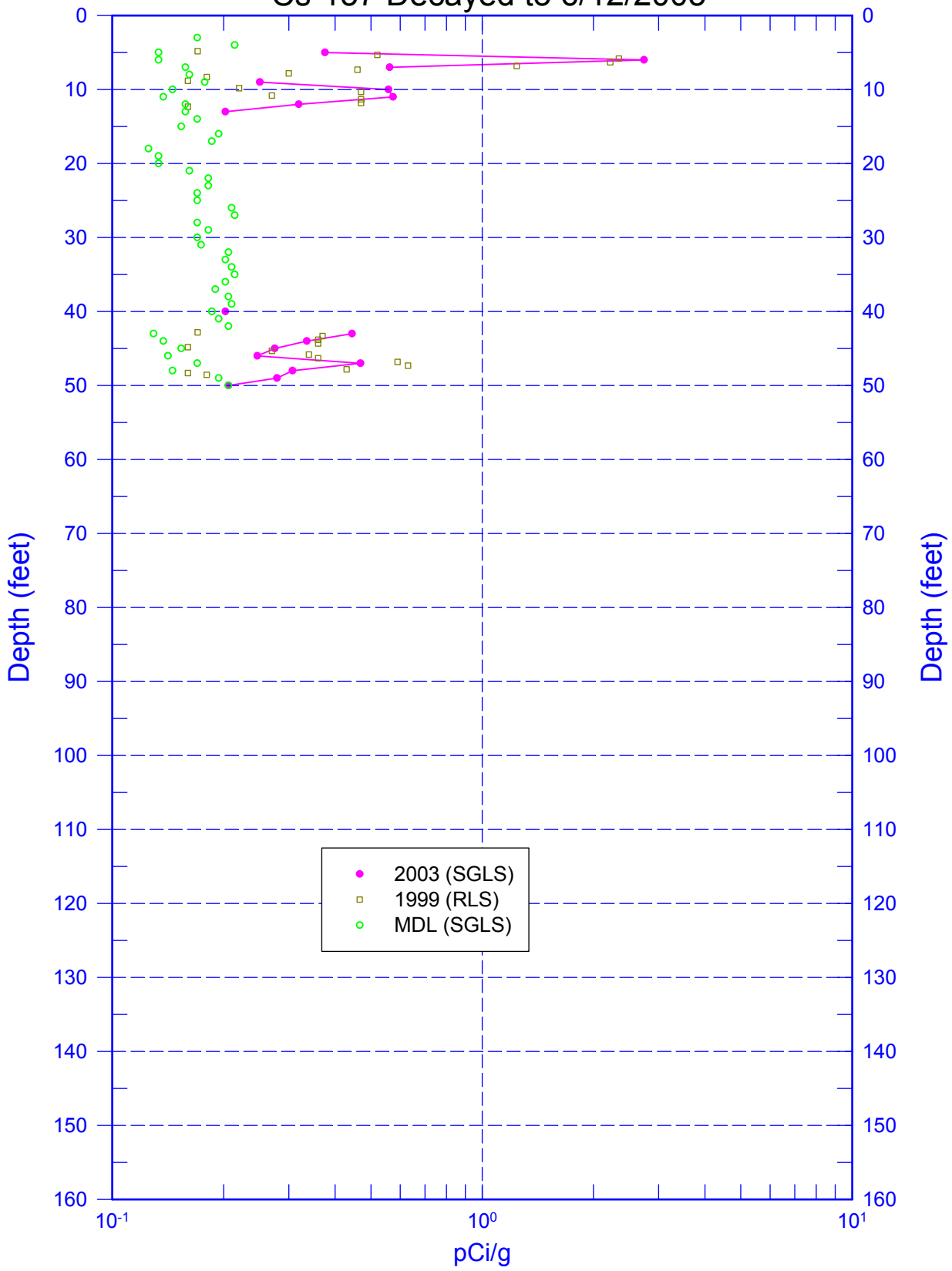
RLS Data Compared to SGLS Data

Cs-137 Decayed to 6/12/2003



Zero Reference = Top of Casing (2003 SGLS & 1999 RLS)
1999 RLS shifted +2.9 ft to align with the SGLS

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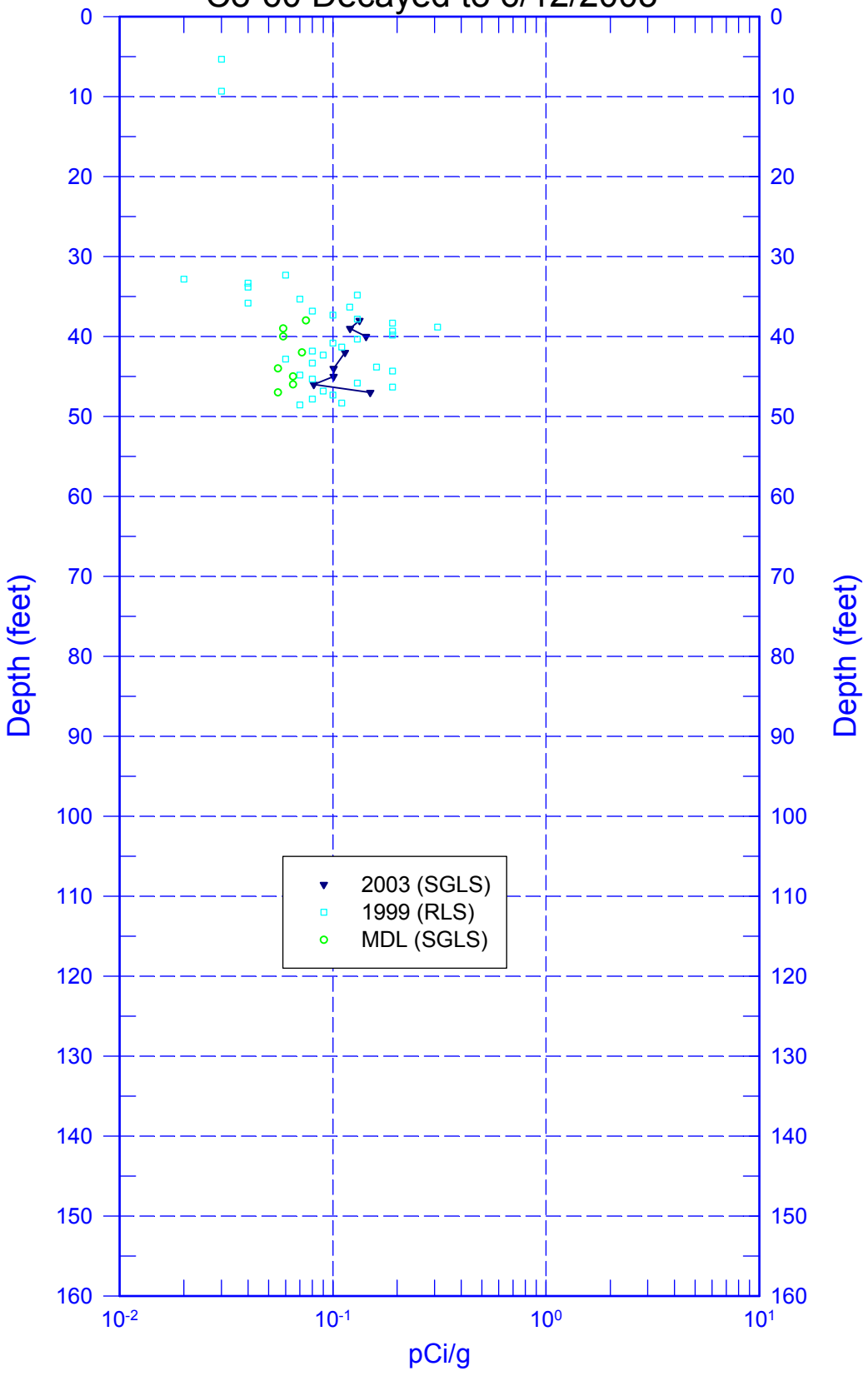
RLS Data Compared to SGLS Data
Co-60 Decayed to 6/12/2003



Zero Reference = Top of Casing (2003 SGLS)
1999 RLS data shifted +2.9 ft to align with 2003 SGLS